

Economic Impact of the North Central West Virginia Technology Industry on the West Virginia Economy

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The opinions herein are those of the author and do not necessarily reflect those of the West Virginia Higher Technology Consortium Foundation, the West Virginia Higher Education Policy Commission, or Fairmont State University.

Executive Summary

There is no question that the technology industry can boost any region's economy. However, defining what sectors can be characterized as within the technology industry is difficult. Some sectors within the technology industry manufacture products while other are engaged in research that may or may not lead to the production of a product. This report combines 52 NAICS sectors into the technology industry in West Virginia, North Central West Virginia, and the I-79 Corridor. These 52 NAICS sectors accounted for

- 7.3% of total employment in the state
- 12.8% of total wages in the state.

The technology industry also accounted for a significant portion of the North Central West Virginia economy. In 2011, the technology industry accounted for:

- 5.05% of total employment in North Central West Virginia
- 7.42% of total wages in North Central West Virginia

The technology industry in North Central West Virginia not only accounted for a significant part of the region's employment and wages but also had a major impact on the region's economy in 2011. In fact, the North Central West Virginia's technology industry had an economic impact of:

- \$1.6 billion of output
- \$953 million of value added
- 11,500 jobs and \$587.2 million of employee compensation

The technology industry in North Central West Virginia also had a significant impact on the West Virginia economy in 2011. The economic activities of the industry resulted in an economic impact of:

- \$1.7 billion of output
- \$974.8 million of value added
- 11,900 jobs and \$597.2 million of employee compensation

While the economic impacts of the North Central West Virginia technology industry were estimated to be significant to the North Central West Virginia and West Virginia economies in 2011, they were conservative. Data restrictions and lack of a universal definition of a technology industry restricted the results.

I. The Technology Industry

Technology has always been around and can be simply defined as the application of knowledge to solve problems or invent useful tools. Technological developments, starting with turning natural resources into simple tools, have allowed people to accomplish tasks more easily and quickly and have expanded the general knowledge base. While the use of the term technology has changed significantly over the years, it has always involved the application of math, science, and the arts for the benefit of life as we know it.

Due to a lack of a universally accepted definition of technology, it is not easy to define clearly all of the sectors that should be considered a technology industry. This study will define a technology industry based on that industry’s demonstrated technological advancements, research and development efforts, as well as average percentage of employee’s in technology-oriented occupations¹. Technology based industries will be identified by their North American Industry Classification System (NAICS) codes.

The following industries² will be considered technology industries in West Virginia, North Central West Virginia, and the I-79 Corridor:

Table 1: Technology Sectors by NAICS Code

NAICS Code	Industry	NAICS Code	Industry
1131	Forestry	3362	Motor vehicle body and trailer manufacturing
2111	Oil and gas extraction	3363	Motor vehicle parts manufacturing
2211	Electric power generation, transmission, and distribution	3364	Aerospace product and parts manufacturing
3241	Petroleum and coal products manufacturing	3369	Other transportation equipment manufacturing
3251	Basic chemical manufacturing	4234	Professional and commercial equipment and supply merchandise wholesalers
3252	Resin, synthetic rubber, and artificial synthetic fibers and filaments manuf.	4861	Pipeline transportation of crude oil
3253	Pesticide, fertilizer, and other agricultural chemical manufacturing	4862	Pipeline transportation of natural gas
3254	Pharmaceutical and medicine manufacturing	4869	Other pipeline transportation
3255	Paint, coating, and adhesive manufacturing	5112	Software publishers
3259	Other chemical product and preparation manufacturing	5161	Internet publishing and broadcasting
3324	Boiler, tank, and shipping container manufacturing	5171	Wired telecommunications carriers
3329	Other fabricated metal product manufacturing	5172	Wireless telecommunications carriers
3332	Industrial machinery manufacturing	5173	Telecommunications resellers
3333	Commercial and service industry machinery manufacturing	5174	Satellite telecommunications
3335	Metalworking machinery manufacturing	5179	Other telecommunications
3336	Engine, turbine, and power transmission equipment manufacturing	5181	ISP & web search portals
3339	Other general purpose machinery manufacturing	5182	Data processing, hosting, and related services
3341	Computer and peripheral equipment manufacturing	5211	Monetary authorities
3342	Communications equipment manufacturing	5232	Securities and commodity exchanges
3343	Audio and video equipment manufacturing	5413	Architectural, engineering, and related services
3344	Semiconductor and other electronic component manufacturing	5415	Computer systems design and related services
3345	Navigational, measuring, electromedical, and control instruments manuf.	5416	Management, scientific, and technical consulting services
3346	Manufacturing and reproducing magnetic and optical media	5417	Scientific research and development services
3353	Electrical equipment manufacturing	5511	Management of companies and enterprises
3359	Other electrical equipment and component manufacturing	5612	Facilities support services
3361	Motor vehicle manufacturing	8112	Electronic and precision equipment repair and maintenance

Note: Sector chosen according to employment factor, research and development efforts, and other criteria.

¹ Industries are categorized as technology based on techniques used by Hecker, David E. “High-technology employment: NAICS-based update.” Monthly Labor Review (July 2005):57-72.

² The medical technology industry was not included but more information can be found in Appendix B.

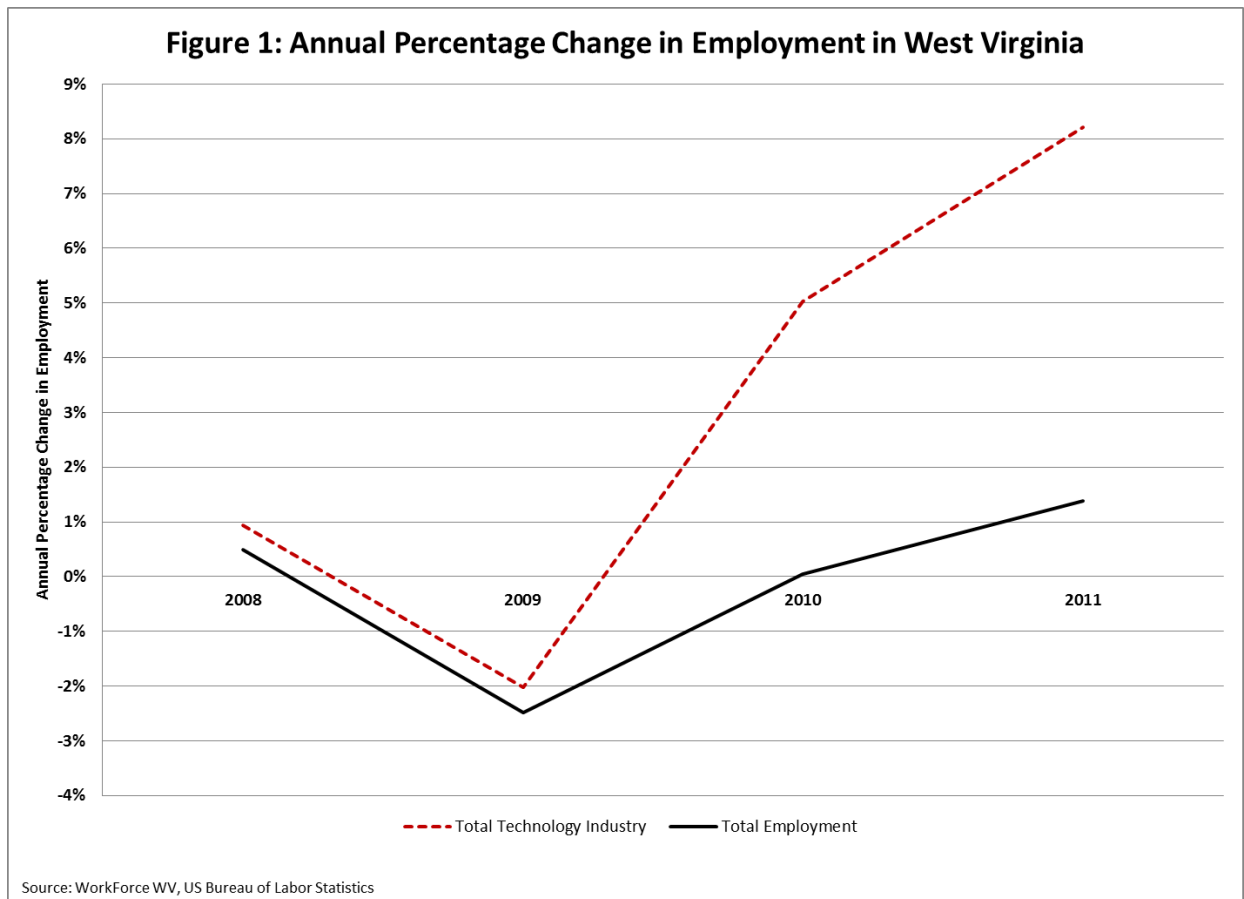
II. West Virginia's Technology Industry

Employment and Wages

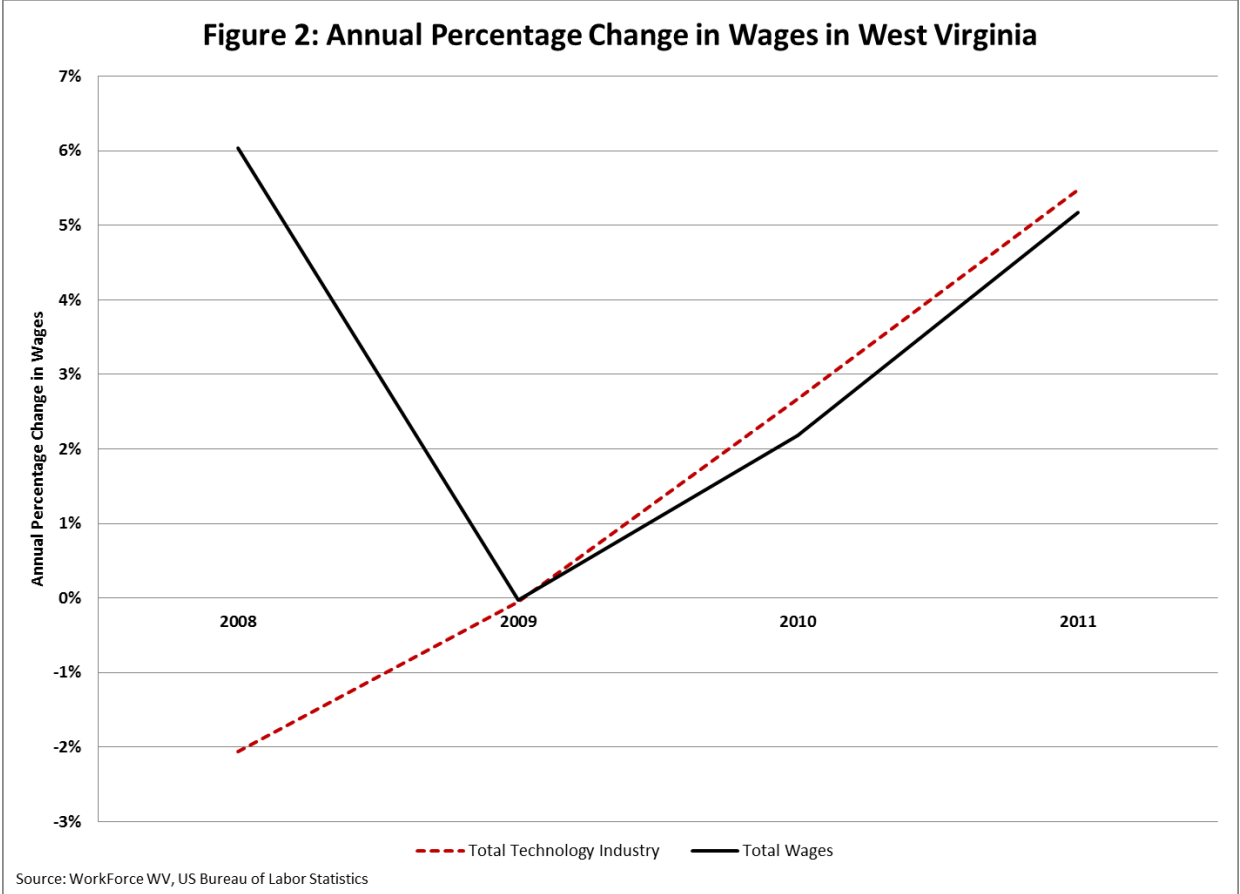
In 2011, West Virginia employed over 700,00 individuals who received wages totalling over \$27.4 billion. The technology industry within the state accounted for a significant portion of those jobs and wages. In fact, in 2011, the technology industry:

- Accounted for 7.3% of total jobs in West Virginia
- Experienced a growth of 8.2% in employment from 2010
- Accounted for 12.8% of the total wages in West Virginia
- Experienced a growth of 5.1% in wages from 2010

These statistics indicate that the employment in the state's technology industry is on the rise. Employment in this industry is also shown to have higher than average wages and thus increases the total wages received within the state. Figure 1 demonstrates that the technology industry in West Virginia has been growing since 2009 after a decline from 2008 to 2009. This growth was far greater than the growth in the state's total employment. In fact, from 2009 to 2011, employment in the state's technology industry grew by 12.2% more than total employment in West Virginia.



Employment growth was accompanied with wage growth in the state’s technology industry as well as in total West Virginia wages. Starting in 2009, wages have been on a rise with an average annual growth rate of 2.7% in the technology industry and a rate of 2.4% in wages overall in West Virginia.



III. Focus on the Technology Industry in North Central West Virginia and the I-79 Corridor

Regions Defined

The technology industry has been demonstrated to be a significant part of the West Virginia economy. It is also a major industry in North Central West Virginia. For the purposes of this report, North Central West Virginia was defined as containing six counties. Those counties are as follows:

- Harrison
- Lewis
- Marion
- Monongalia
- Preston
- Upshur

Within these counties is the I-79 Technology Park³, which contains a high concentration, but not all, of the technology industries in North Central West Virginia. The counties in North Central West Virginia contain a significant part of the technology industry for the state of West Virginia but due to worker-flow rate (i.e. commuting patterns) other parts of the region should be explored as well to get a complete picture when it comes to the technology industry that encompasses West Virginia. The region known as the I-79 Corridor, for the purposes of this report, includes the six counties located in North Central West Virginia as well as six other West Virginia counties as well as two counties in Pennsylvania and one county in Maryland. Thus, the I-79 Corridor contains the following counties:

West Virginia:

Barbour
Braxton
Doddridge
Gilmer
Harrison
Lewis
Marion
Monongalia
Preston
Randolph
Taylor
Upshur

Pennsylvania:

Fayette
Greene

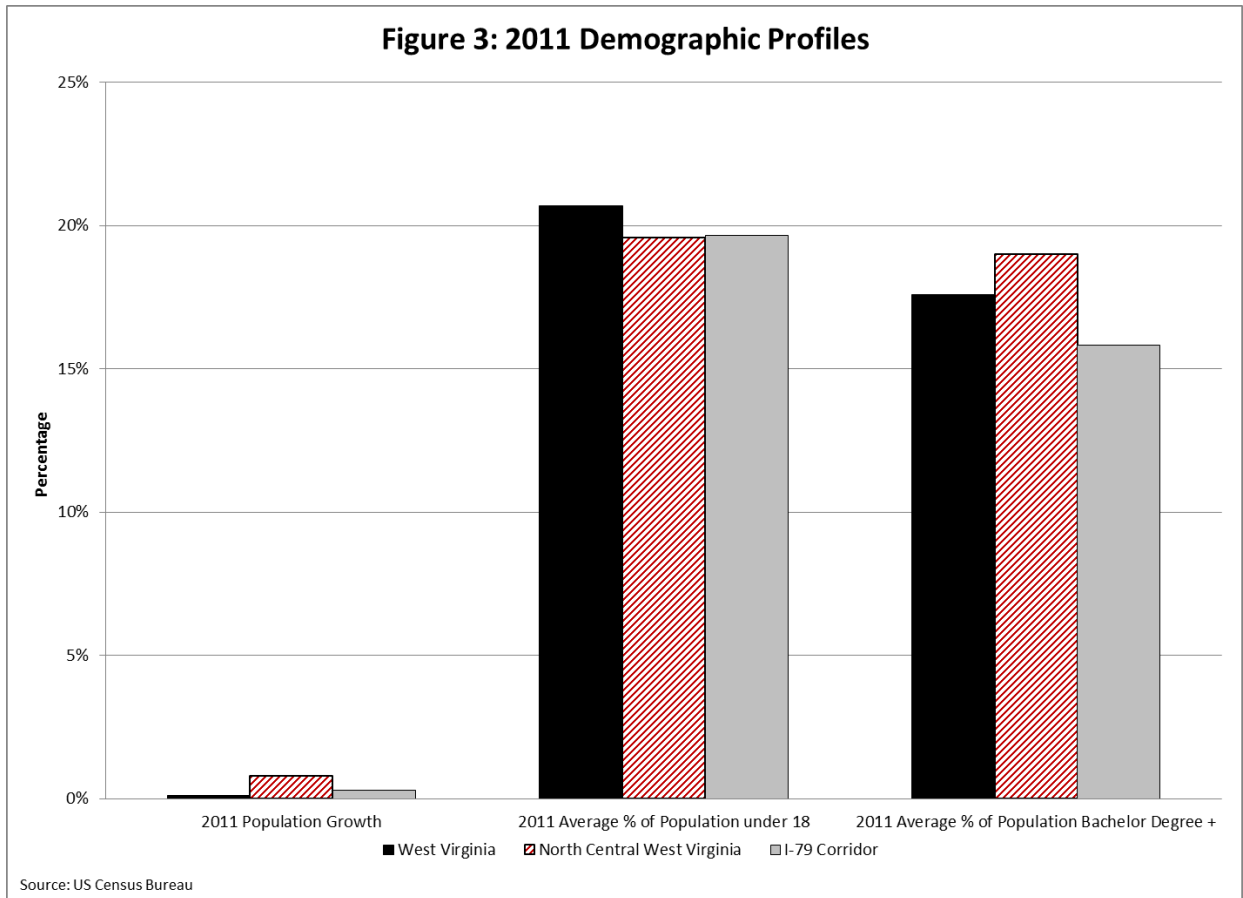
Maryland:

Garrett

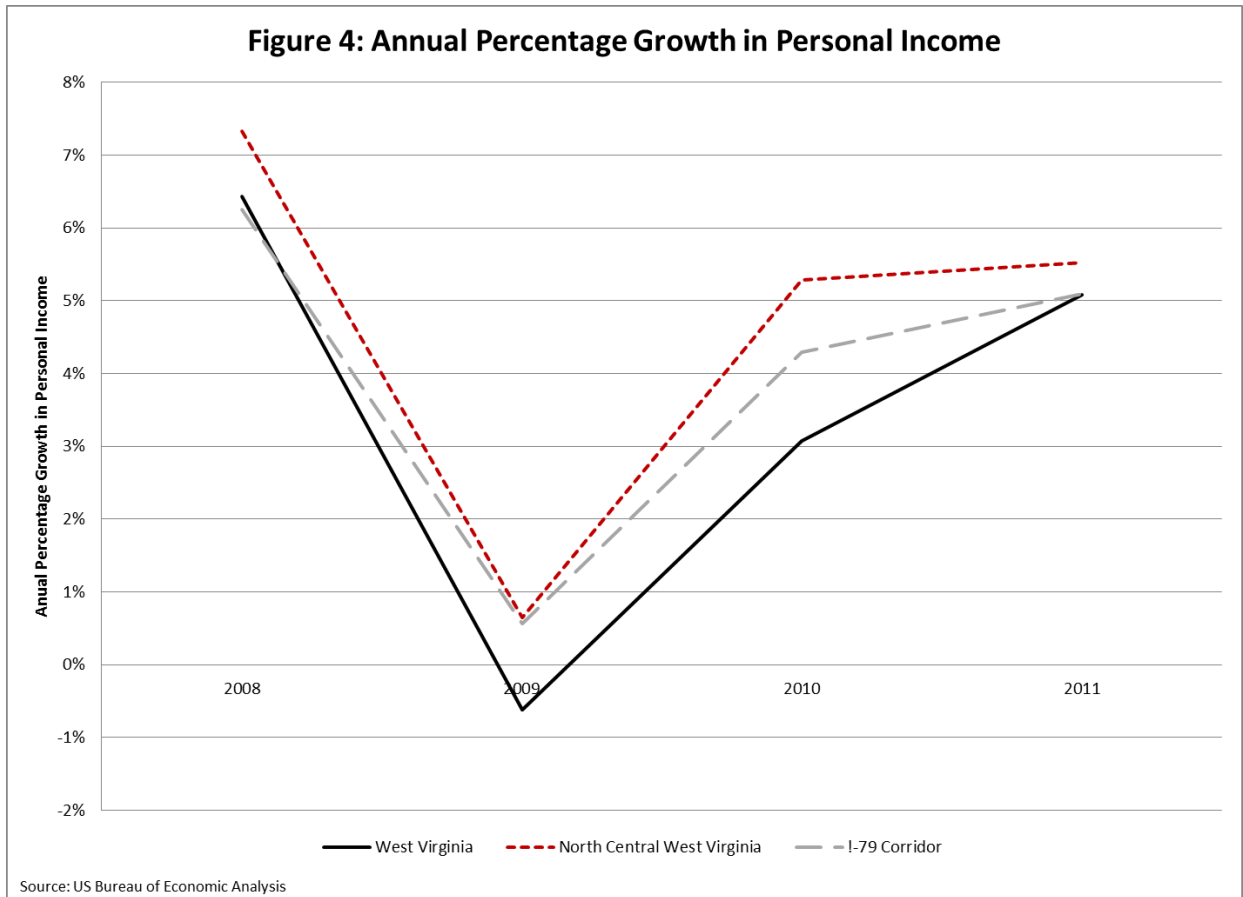
³ The I-79 Technology Park includes over 400 acres and is home to over 30 businesses.

Regional Profiles

The North Central West Virginia and I-79 Corridors are unique regions in West Virginia. While these two regions contain a significant portion of the state's technology industry, their demographics also stand out, as shown in Figure 3. Population in North Central West Virginia grew by 0.8% in 2011 while the state only experienced a 0.1% growth in population. Both the North Central West Virginia and I-79 Corridor regions have less than the state average in percentage of the population 18 years old or younger, which may indicate that these regions have a more mature population than found on average in the state. The North Central West Virginia region has, on average, a higher educational attainment level than found throughout the state. In 2011, the percentage of the population with a Bachelor's degree or above was 19% for North Central West Virginia but only 17.6% in West Virginia.



Personal income levels are good indicators of economic growth or decline of a region. Figure 4 shows the average annual personal income growth of West Virginia as well as the North Central West Virginia and I-79 Corridor regions. All three areas experienced a decline from 2008 to 2009 in personal income but then recovered the next year. In fact, from 2009 to 2011, personal income has grown by an average annual growth rate of 2.5% in West Virginia, 3.8% in North Central West Virginia, and 3.3% in the I-79 Corridor.



Technology Industry in North Central West Virginia and the I-79 Corridor

A significant portion of West Virginia's technology industry is located within the North Central West Virginia and I-79 Corridor. In fact, in 2011, approximately 12.7% of the state's technology industry employment was located within the six counties that make up the North Central West Virginia region. These six counties plus the remaining counties in the I-79 Corridor region accounted for approximately 8,850 jobs in the technology industry, most of which were specific to the architectural, engineering, and related services sector.

Table 2 breaks down employment and wages for the technology industry by county in North Central West Virginia in 2011. As Table 2 indicates, while Monongalia County has the most employment and wages, Marion County is most significantly impacted by the industry with technology accounting for 7.05% of total employment and 9.2% of total wages.

Table 2: Employment and Wages in North Central West Virginia Technology Counties							
	Harrison	Marion	Monongalia	Preston	Lewis	Upshur	NCWV Total
Total Technology Employment	1,441	1,449	3,051	80	304	179	6,504
Total County Employment	34349	20550	51947	6872	7006	8176	128,900
% of Total County Employment	4.20%	7.05%	5.87%	1.16%	4.34%	2.19%	5.05%
Total Technology Wages	\$94,792,753	\$75,645,180	\$181,173,144	\$2,020,886	\$30,637,558	\$7,712,201	\$391,981,722
Total County Wages	\$1,396,495,974	\$822,587,063	\$2,233,783,209	\$239,416,932	\$291,760,609	\$295,719,895	\$5,279,763,682
% of Total County Wages	6.79%	9.20%	8.11%	0.84%	10.50%	2.61%	7.42%

Source: US Bureau of Labor Statistics (<http://www.bls.gov>)

IV. Economic Impact of North Central West Virginia's Technology Industry on the Economy

Economic Impact Overview

The economic impact of the North Central West Virginia technology industry on the North Central West Virginia and the West Virginia economies in 2011 was estimated using data collected from the United States Bureau of Labor Statistics and the IMPLAN® 2.0 input-output modeling system.⁴ Results of the economic impact analysis quantify the direct, indirect, induced, and total economic impacts associated with the North Central West Virginia technology industry in 2011. Direct effects were estimated using the employment levels and employee compensation paid by the industry in 2011. The indirect effects represent the economic activities that result from purchases from suppliers of the industry. An example of the indirect effects of the technology industry includes an engineering consulting firm or chemical manufacturing company buying office supplies from a local office supply store. This store then purchases goods and services, pays taxes, and pays employees with the money spent by the technology industry companies. This continued re-spending is defined as the indirect effect. The induced effects of the technology industry in North Central West Virginia represent the expenditures by households of the wages and salaries they received associated with the direct and indirect effects. The sum of the direct, indirect, and induced economic impacts is the total impact of the industry.

The direct, indirect, induced, and total economic impacts of the North Central West Virginia technology industry is represented by output, value added, employment, and employee compensation.

Economic Impact on North Central West Virginia's Economy 2011

Accounting for 5.05% of the total employment in North Central West Virginia, the technology industry had a significant impact on the North Central West Virginia economy in 2011. As shown in Table 3, the technology industry had a \$1.6 billion economic impact on the output in North Central West Virginia along with a \$953 million value added impact. In 2011, the technology industry directly accounted for 6,500 jobs in North Central West Virginia which is estimated to have resulted in a total employment impact of 11,500 jobs and total employee compensation of \$597.2 million.

⁴More information regarding the IMPLAN 2.0 input-output modeling system can be found at <http://www.implan.com>

Table 3: Economic Impact of North Central West Virginia's Technology Industry on the North Central West Virginia Economy			
2011			
	Direct	Indirect and Induced	Total
Output (in millions)	\$1,060.7	\$559.2	\$1,619.8
Value Added (in millions)	\$614.9	\$338.1	\$953.0
Employment (jobs)	6,500	5,000	11,500
Employee Compensation	\$392.0	\$195.3	\$587.2

Note: North Central West Virginia includes the following counties: Harrison, Lewis, Marion, Monongalia, Preston, and Upshur

Economic Impact on West Virginia's Economy 2011

The North Central West Virginia technology industry not only had a significant impact on the region's economy but is also estimated to have had a significant impact on the West Virginia economy in 2011. This industry accounted for \$1.7 billion of output and \$974.8 million in value added impact. The North Central West Virginia technology industry accounted for 0.9% of the state's total employment but had an estimated total employment impact of 11,900 jobs and \$597.2 million in employee compensation.

Table 4: Economic Impact of North Central West Virginia's Technology Industry on the West Virginia Economy			
2011			
	Direct	Indirect and Induced	Total
Output (in millions)	\$1,060.7	\$601.9	\$1,662.6
Value Added (in millions)	\$614.9	\$359.9	\$974.8
Employment (jobs)	6,500	5,400	11,900
Employee Compensation	\$392.0	\$205.2	\$597.2

Note: North Central West Virginia includes the following counties: Harrison, Lewis, Marion, Monongalia, Preston, and Upshur

The economic impacts of the North Central West Virginia technology industry are significant but conservative. Some of the aspects of the technology industry, such as employment and employee compensation, could not be disclosed by the United States Bureau of Labor Statistics and thus was not included in the results.

Appendix A: Economic Glossary

Direct Effects

It is a series of production changes or expenditures made as a result of an activity or policy; these initial changes are applied to the multipliers in an IMPLAN model, which calculates how the region will respond

Economic Impact Modeling

Is a software, data, or technique that allows an analyst to trace spending through an economy and measure the cumulative effects of that spending

Employee Compensation

Is the total payroll cost of the employees paid by the employer; includes wage and salary, all benefits, and employer paid payroll taxes

Indirect Effects

The impact of local industries buying goods and services from other local industries

Induced Effects

The response by an economy to a direct effect that occurs through re-spending of income received by a component of value added

Jobs

Aka employment; the annual average of monthly jobs in that industry; can be either full-time or part-time

NAICS

North American Industry Classification System; groups established by similarity of production process

Output

Represents the value of industry production

Personal Income

Income received by persons from all sources; it includes income received from participation in production as well as from government and business transfer payments.

Value Added

The difference between an industry's or an establishment's total output and the cost of its intermediate inputs' consists of compensation of employees, taxes on production and imports less subsidies, and gross operating surplus.

Appendix B: Medical Technology Industry

The medical technology industry is also considered a major aspect of any economy and plays a critical role in our health economy. This industry is typically analyzed outside of the technology industry as a whole and, just like the technology industry, is difficult to define. For the purposes of this report, the medical technology industry includes the following NAICS sectors⁵:

Medical Technology Industry by NAICS Sector	
NAICS Code	Industry
325411	Medicinal and botanical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
34510	Electromedical and electrotherapeutic apparatus manufacturing
334517	Irradiation apparatus manufacturing
339112	Surgical and medical instrument manufacturing
339113	Surgical appliance and supplies manufacturing
339114	Dental equipment and supplies manufacturing
339115	Ophthalmic goods manufacturing
339116	Dental laboratories
621511	Medical and diagnostic labs and outpatient and other ambulatory care services

Note: any research and development for any industry, including medical, was included in the Scientific Research and Development Services Sector (NAICS 5417)

Due to the disclosure standards of West Virginia and the US Bureau of Labor Statistics, employment and wage data for these medical technology industry sectors by county is not available for public distribution. Thus the economic impact, while potentially significant in this region, cannot be estimated for North Central West Virginia.

⁵ NAICS sectors chosen to coincide with previous economic impact reports including but not limited to: AdvaMed. (2010). "State Economic Impact of the Medical Technology Industry." The Lewin Group.